J. R. le B. Tomlin unreservedly turned over for the use of the editor his great manuscript list of the generic names used for mollusca, on which he has been working for many years.

Such a work as this serves to emphasize the international and cooperative features of scientific work, and to show that it is possible to maintain a great republic of workers, without regard for race and without any external coercion. In the field of science we have a working League of Peoples, which may well serve as a model for other efforts to unite humanity for the common good.

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## A NEW COLOR REACTION OF VITAMIN $B_1$ (THIAMIN, ANEURIN)

STUDYING the influence of pure synthetic vitamin $B_1$ (thiamin, aneurin) on blood phosphate fractions[1] by Fiske and Subbarow's technic we were surprised by the great increase of the values when thiamin was added. More accurate investigations showed that pure thiamin produced alone an intense blue color by the use of ammonium molybdate in sulfuric acid solution and aminonaphthosulfonic acid solution. This reaction being nevertheless non-specific permits, however, the determination of the vitamin when the concentration is above 100γ in pure aqueous solution. Since the color reaction follows the Beer's law it was possible to determine the optimal spectral zone for photometric readings. A Pulfrich spectrophotometer was employed, using filter S 72. The absorption index, $\frac{\text{concentration}}{\text{extinction coeff.}}$ was calculated and found to be 0.375. The technic for the determination is easy and rapid. To a 25 ml flask the thiamin solution (more than 100γ) is added together with 5 ml of a 2.5 per cent. ammonium molybdate solution in 3N sulfuric acid and then 1 ml of a 0.25 per cent. aminonaphthosulfonic acid containing sodium bisulfite and sodium sulfite (as prepared for blood phosphorus determination by Fiske and Subbarow).[2] The flask is filled to the mark with distilled water and the color read after 10 minutes using a 3 ml cup and filter S 72 in a Zeiss photometer. The extinction value is multiplied by 0.375 to obtain the thiamin in the sample.

When phosphorus is also present in the solution the color intensity represents the vitamin plus phosphorus content. By destroying organic matter with sulfuric-nitric mixture in another sample and neutralizing, then proceeding as above, the color developed represents only the phosphorus content. The difference between the first and the second determinations gives the thiamin content.

[1] G. G. Villela and A. M. Leal, *Compt. Rend. Soc. Biol. Paris*, in press.

[2] C. H. Fiske and Y. Subbarow, *Jour. Biol. Chem.*, 66: 375–400, 1925.

A more detailed study of this reaction will be published elsewhere.

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## ON THE NATURE OF FRICTION

FRICTION between solid surfaces is ordinarily thought of as due to the interlocking of surface irregularities. That static friction also depends on the molecular attractions between the surfaces has recently been shown in a series of experiments on the tangential force between two smooth, clean glass surfaces in contact.

We placed a short piece of fire-polished glass tubing inside of a longer straight glass tube. This tube had a sufficiently large bore so that the smaller piece could slide freely within it. This assemblage was thoroughly heated and carefully evacuated by means of an efficient mechanical vacuum pump after which the outer tube was sealed off in the evacuated state. The assemblage was then enclosed in a water jacket for temperature control and clamped on a tilt table. This arrangement permitted us to determine accurately the angle at which the small glass tube started to slide under gravity within the larger tube.

During the course of the experiments it was discovered that the static friction, as computed from the angle of slip, was much larger for surfaces baked in a vacuum than for surfaces which were exposed to the air in the laboratory. The lower friction of the exposed surfaces undoubtedly was due to a moisture and gas film between them.

Several assemblages were constructed, baked out and sealed under vacuum. In each the coefficient of static friction decreased almost rectilinearly with the number of passes of the slider. In one case, where both slider and enclosing tube were made of soft soda glass, the coefficient of static friction decreased to one half its original value in 44 passes of the slider.

The appearance of the sliding surfaces was much modified during the experiment. The fresh surfaces looked perfectly smooth under a microscope, but after a few passes of the slider the surfaces became pitted. The pits were approximately round and not elongated in the direction of the motion, showing that parts of the surfaces had been torn out as if welded junctions had been broken.

In all our experiments, using baked and evacuated apparatus, the coefficient of static friction decreased with wear. How far this decrease in friction continues is not known as yet, but it is not likely to go much below one half of its virgin value. Certain difficulties with the breaking of the outer tube due to the impacts of the slider have prevented us from extending the experiment indefinitely with a given tube.

Our interpretation of these results is that a large